

**WHAT IS CLAIMED IS:**

1. An optical add/drop device comprising:

an optical demultiplexer for separating WDM signal light into  $n$  ( $n$  is an integer satisfying  $1 < n$ ) optical signals having different wavelengths, said WDM signal light being obtained by wavelength division multiplexing said  $n$  optical signals;

$n$  first optical switches each having first and second input ports and first and second output ports, said  $n$  optical signals output from said optical demultiplexer being supplied to said first input ports of said  $n$  first optical switches, respectively;

a second optical switch having  $k$  ( $k$  is a natural number) input ports and  $n$  output ports, an optical signal to be added being supplied to at least one of said  $k$  input ports of said second optical switch, said  $n$  output ports of said second optical switch being connected to said second input ports of said  $n$  first optical switches, respectively;

$n$  regenerators connected to said first output ports of said  $n$  first optical switches, respectively;

an optical multiplexer for wavelength division multiplexing optical signals output from said  $n$  regenerators; and

a third optical switch having  $n$  input ports and  $k$  output ports, said  $n$  input ports of said third optical switch being connected to said second output ports of said  $n$  first optical switches, respectively, an optical signal to be dropped being output from at least one of said  $k$  output ports of said third optical switch.

2. An optical add/drop device according to claim 1, further comprising  $k$  wavelength converters connected to said  $k$  output ports of said third optical switch, respectively.

3. An optical add/drop device according to claim 1, further comprising  $n$  wavelength converters connected between said  $n$  input ports of said third optical switch and said second output ports of said  $n$  first optical switches, respectively.

4. An optical add/drop device according to claim 1, further comprising  $n$  wavelength converters connected between said optical demultiplexer and said first input ports of said  $n$  first optical switches, respectively.

5. An optical add/drop device according to claim 1, wherein:

said second optical switch further has  $r$  ( $r$  is a natural number) input ports;

said third optical switch further has  $r$  output

ports; and

said optical add/drop device further comprises  $r$  links for connecting said  $r$  input ports of said second optical switch and said  $r$  output ports of said third optical switch.

6. An optical add/drop device comprising:

an optical demultiplexer for separating WDM signal light into  $n$  ( $n$  is an integer satisfying  $1 < n$ ) optical signals having different wavelengths, said WDM signal light being obtained by wavelength division multiplexing said  $n$  optical signals;

$n$  optical switches each having first and second input ports and first and second output ports, said  $n$  optical signals output from said optical demultiplexer being supplied to said first input ports of said  $n$  optical switches, respectively;

a first electrical switch having  $k$  ( $k$  is a natural number) input ports,  $s$  ( $s$  is a natural number) input ports, and  $n$  output ports;

$k$  first opto/electrical converters connected to said  $k$  input ports of said first electrical switch, respectively;

$n$  first electro/optical converters for connecting said  $n$  output ports of said first electrical switch and

said second input ports of said n optical switches,  
respectively;

an optical multiplexer for wavelength division  
multiplexing optical signals output from said first  
output ports of said n optical switches;

a second electrical switch having n input ports, k  
output ports, and s output ports;

n second opto/electrical converters for connecting  
said n input ports of said second electrical switch and  
said second output ports of said n optical switches,  
respectively;

k second electro/optical converters connected to  
said k output ports of said second electrical switch,  
respectively; and

s electrical links for connecting said s input  
ports of said first electrical switch and said s output  
ports of said second electrical switch, respectively.

7. An optical add/drop device comprising:

an optical demultiplexer for separating WDM signal  
light into n (n is an integer satisfying  $1 < n$ ) optical  
signals having different wavelengths, said WDM signal  
light being obtained by wavelength division multiplexing  
said n optical signals;

n optical switches each having first and second

input ports and first and second output ports, said n optical signals output from said optical demultiplexer being supplied to said first input ports of said n optical switches, respectively;

a first electrical switch having k (k is a natural number) input ports, s (s is a natural number) input ports, and n output ports;

(k + s) first opto/electrical converters connected to said (k + s) input ports of said first electrical switch, respectively;

n first electro/optical converters for connecting said n output ports of said first electrical switch and said second input ports of said n optical switches, respectively;

an optical multiplexer for wavelength division multiplexing optical signals output from said first output ports of said n optical switches;

a second electrical switch having n input ports, k output ports, and s output ports;

n second opto/electrical converters for connecting said n input ports of said second electrical switch and said second output ports of said n optical switches, respectively;

(k + s) second electro/optical converters connected

to said  $(k + s)$  output ports of said second electrical switch, respectively; and

$s$  optical links for connecting said first opto/electrical converters respectively corresponding to said  $s$  input ports of said first electrical switch and said second electro/optical converters respectively corresponding to said  $s$  output ports of said second electrical switch, respectively.

8. An optical add/drop device adapted to first and second optical paths, comprising:

first and second optical add/drop units connected to said first and second optical paths, respectively;

an add switch for selectively adding an optical signal to any one of said first and second optical add/drop units; and

a drop switch for selectively dropping an optical signal from any one of said first and second optical add/drop units;

each of said first and second optical add/drop units comprising:

an optical demultiplexer for separating WDM signal light into  $n$  ( $n$  is an integer satisfying  $1 < n$ ) optical signals having different wavelengths, said WDM signal light being obtained by wavelength division multiplexing

said n optical signals;

n optical switches each having first and second input ports and first and second output ports, said n optical signals output from said optical demultiplexer being supplied to said first input ports of said n optical switches, respectively;

n regenerators connected to said first output ports of said n optical switches, respectively; and

an optical multiplexer for wavelength division multiplexing optical signals output from said n regenerators;

said add switch being connected to said second input ports of said n optical switches;

said drop switch being connected to said second output ports of said n optical switches.